Chapter VI
Congestion Management System

The congestion management system (CMS) for the Memphis MPO area is an evaluation process and decision-influencing mechanism of the Memphis Urban Area Metropolitan Planning Organization. The CMS plan was first adopted by the MPO in 1996 and updated in 2002 with an implementation review. The CMS plan provides a consistent basis to make transportation investment decisions relating to traffic congestion. Some elements of the CMS plan have been ongoing in the Memphis area for a number of years, while others are new initiatives and responsibilities.

1. Related LRTP Goals and Objectives

The LRTP goals and objectives established by the Memphis MPO and outlined in Chapter 3 provide the framework to identify the appropriate strategies to resolve congestion issues. Specifically, Goals 1, 7 and 9 provide the direction to improve transit ridership, increase the use of van pool and car pool programs, further develop non-motorized transportation modes, and implement strategies and polices to reduce congestion. These goals and objectives are listed below.

LRTP Goal		Objective
1.	Increase accessibility and mobility for people utilizing the MPO region's transportation network.	Increase membership by 1,000 members per year (net) in the Memphis Area Rideshare Program.
		Continue to explore the use of existing rail lines for transit service.
		Improve transit services to meet additional needs and demands.
		Promote the use of employer subsidized transit passes.
		Continue to support efforts to secure a permanent and sustainable source of local funding for mass transit.
		Increase the inventory of handlift and other demand responsive types of transit to better serve the elderly and disabled.
7	Encourage and provide adequate facilities for non-motorized transportation modes.	Work with jurisdictions and bike and pedestrian clubs in the Memphis MPO region to develop a regional bicycle and pedestrian plan.

	LRTP Goal	Objective
7	(Cont)	Work with MATA to increase options for bicyclists who access mass transit (bike racks, lockers, etc).
		Develop project selection criteria that encourage development and enhancement of bicycle and pedestrian facilities.
		Continue to collect and analyze socio-economic data for the Memphis MPO region in an effort to make more informed decisions regarding transportation and its potential affects on all area citizens.
9	Continue to develop a multi-modal transportation network that utilizes strategies for addressing congestion management and air quality issues in the Memphis MPO region.	Promote street networks that ensure minimal congestion by reducing travel delays in accordance with the guidelines in the MPO's adopted CMS Plan.
		Encourage strategies that reduce traffic emissions in an effort to improve air quality.
		Continue to implement and promote strategies and policies such as access control, HOV facilities, travel demand management, mass transit and alternative transportation to improve congestion conditions.
		Develop an up-to-date CMS Plan that is concurrent with horizon years adopted in the LRTP.

2. Definition of Congestion

Congestion is the delay time experienced in travel as a result of traffic volumes that are higher than the levels that permit "free flow" traffic speeds. The primary issue in defining "congestion" is to find the level at which the transportation system performance is no longer acceptable due to traffic interference. Acceptable levels of congestion vary

from region to region. For the Memphis region, the MPO Engineering and Technical Committee (ETC) has determined that congestion is defined as those roadway segments with a volume to capacity (V/C) ratio greater than 0.90 as determined from the Regional Travel Demand Forecasting Model and as those roadway segments with a Level of Service (LOS) of E or F when evaluated utilizing other methods. The ETC has further recommended that in future updates of the CMS consideration be given to including an evaluation of the duration of congestion and incorporation of the Highway Capacity Manual (HCM) methodology for capacity evaluations into the new Regional Travel Demand Forecasting Model.

The V/C ratio is the projected or observed volume of traffic on a corridor divided by the capacity of the roadway link. The LOS is a qualitative measure of roadway performance as outlined in the Transportation Research Board publication *Highway Capacity Manual* (HCM). LOS is reported in a scale of A through F, with A representing the best operating conditions and F the worst. LOS E or F indicates the roadway is congested and is operating at levels exceeding design capacity. A variety of factors are used to determine LOS, including volume, number of lanes, lane width, percent truck traffic, and average travel speed. In addition, the methodology for defining LOS varies by facility type. A complete summary of the HCM methodology for determining LOS is contained in **Appendix K**.

3. Existing Congested Network

In accordance with the CMS Plan, the existing draft Congested Network was determined utilizing the 2004 Regional Travel Demand Model to screen roadway segments based on the V/C ratio. Through workshops with the MPO ETC, it was decided that supplemental methodology should be employed to assist with the definition of the existing congested network. The ETC recommended the supplemental process of screening roadway segments utilizing the HCM methodology for determining LOS and to further supplement that evaluation with actual travel time data previously collected by the local agencies. The HCM evaluations were conducted utilizing data obtained from the local agencies, TDOT and MDOT, including the TDOT Tennessee Roadway Management Information System (TRIMS) database, traffic count data, percentage of truck traffic, and roadway inventories. Travel time data collected as part of other local projects was used to determine the LOS for the arterial roadways where this data was available. Travel time data for approximately 100 roadway corridors were used in this evaluation.

Utilizing both the model and supplemental data, the ETC evaluated each corridor and determined those corridors that should be included in the Existing Congested Network. Some roadway segments that were identified as congested by the methods outlined above were deleted from the Congested Network. Those segments deleted were typically short, one block sections where the congestion was more related to a single intersection capacity issue and not corridor capacity. In other cases, longer segments that included all of the congested segments replaced short segments of a road that were closely spaced. The Principal Freight Corridors identified in the freight analysis were used to assist with the determination of the boundaries of the congested corridors. The Existing Congested

Network, as determined by this process and in accordance with the CMS Plan, is identified in **Figure 34** and in **Table 15**. The column titled ***Source*** in the table identifies the source of data used to determine the congestion. ***M*** indicates the roadway segment was identified based on a V/C ratio from the Regional Travel Demand Forecasting Model. ***S*** indicates the roadway segment was identified using other supplemental data, as previously noted. This information was then compared to the principal freight corridors to identify the Congested Freight Corridors, as shown in Chapter V and are identified in Table 15 with a symbol  .

Figure 34
Existing Congested Network

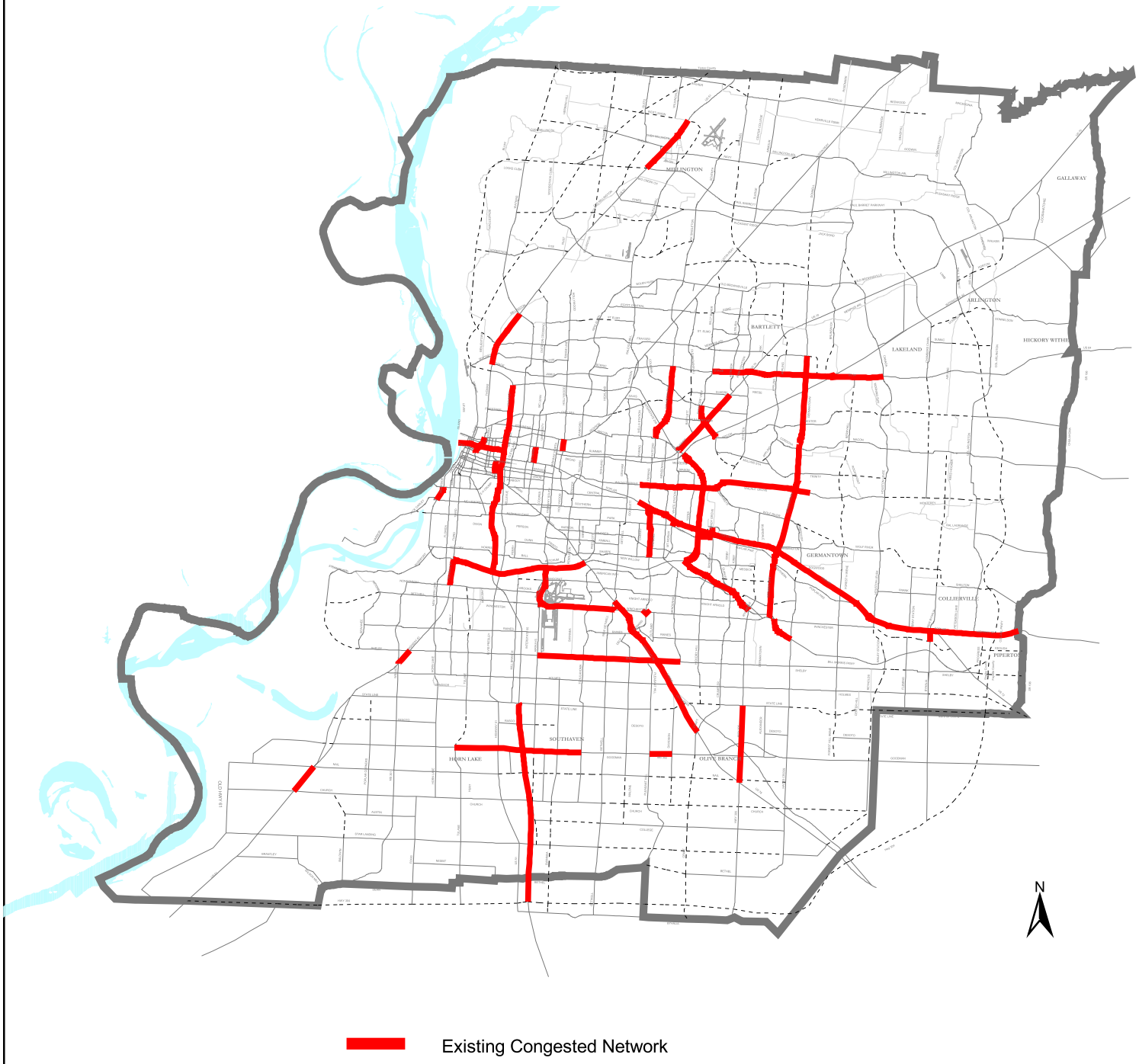


Table 15 - Existing Congested Network Roads

Road	Location	V/C Ratio	LOS	Source
Bill Morris Parkway (SR 385)	I-240 to Riverdale		F	S
Bill Morris Parkway (SR 385)	Winchester to Hacks Cross		E	S
Byhalia	Shelby to Frank	1.12	F	M+S
Covington Pike	Macon to Stage		F	S
Germantown	Winchester to Brother		F	S
Germantown (Hwy 305)	Stateline to US 78		F	S
Goodman	Pleasant Hill to Davidson		F	S
Goodman	Tulane to Tchuilahoma		F	S
Hollywood	Sam Cooper to Jackson	1.25		M
HWY 61	Brooks to I-240 S		F	S
HWY 61	Church to Nail		F	S
HWY 61	Weaver to Shelby		E	S
I-240	Bill Morris Pkwy (SR 385) to I-40 E		F	S
I-240	I-55 to Lamar (US 78)		F	S
I-240 MT	I-55 to I-40	1.05	F	M
I-40	Mississippi River to FA 101 Connector	1.25	E	M + S
I-55	HWY 304 to Stateline		E	S
I-55	McLemore to I-55 Bridge		E	S
I-55	US 61 to I-240 S		E	S
Interchange	Perkins at Winchester	1.09	F	M
Interchange	US 64 at I-40	1.19	F	M
McLean	Poplar to North Parkway	0.95	F	M + S
Park	I-240 E to Ridgeway		E	S
Pauline	Linden to Jefferson	0.93	F	M + S
Perkins	Poplar to Willow		F	S
Plough Boulevard	Airways to I-240	1.17	E	M + S
Poplar Avenue	Perkins to Chulahoma		E	S
Ridgeway/ Shady Grove	Park to Briarcrest		F	S

Table 15 (Cont.)				
Road	**Location**	**V/C Ratio**	**LOS**	**Source**
Shelby	I-55 to Mendenhall		F	S
Stage	Bartlett Blvd to Houston Levee		E	S
Summer	I-40 to Elmore		F	S
Sycamore View	Macon to Raleigh Lagrange		F	S
Thomas	Washington to Jackson	1.00	F	M + S
Thomas	Stage to Watkins		F	S
US 51	Paul Barrett Pkwy (SR 385) to West Union		F	S
US 78	Getwell to Craft		F	S
Walnut Grove	Waring to Walnut Bend	1.05	F	M + S
White Station	Poplar to Park		F	S
Winchester	Airways to Air Park		F	S

Also identified as congested freight corridors with 10% or more truck volumes of the total ADT

4. Identification of CMS Strategies

The Memphis MPO goals and objectives and the congestion management system plan provide the impetus and outline of strategies to help resolve these congestion issues. The following paragraphs will outline the methodology and process to evaluate projects, the process used to identify the appropriate strategies, and provide a menu of strategies that are relevant to resolving the congestion.

Project Evaluation Methodology and Process

In response to the LRTP goals and objectives and to provide an orderly methodology to evaluate projects for funding, the ETC developed criteria for the evaluation of projects that are proposed for inclusion in the transportation improvement program (TIP). The two major funding categories in the TIP, which the MPO controls, are the Surface Transportation Program (STP) and the Congestion Mitigation and Air Quality (CMAQ) program. The criteria for evaluating projects for both of these programs are included in **Appendix M**. As can be seen from the information in **Appendix M**, congestion management is a major consideration for projects in both of these funding categories, accounting for 20% of the total score for STP projects and 30% for CMAQ projects.

The STP evaluation criteria require quantification of the proposed improvements to determine the changes in level of service that will occur as a result of implementation of the project. The project is to be evaluated comparing the existing conditions on that roadway versus the LRTP forecasted traffic on the proposed improvements. The projects that provide the most improvement in congestion will be given higher scores for that

item. Projects that include roadways that are a part of the Congested Network are also given higher scores.

Congestion management significantly influences the evaluation of potential CMAQ projects. Projects that will impact a roadway on the congested network, that have significant congestion relief outcomes, and that fulfill the intent of the CMS plan are given higher rankings.

For both STP and CMAQ projects, the sponsoring agency, with assistance from the MPO staff, is responsible for demonstrating that the project employs strategies that are consistent with the CMS Plan and for presenting documentation regarding the degree of congestion relief that will be attained. Documentation can be presented in many forms, but should include data to demonstrate how the project will result in better V/C ratios or LOS. Air quality analyses, travel time runs and capacity analyses are the typical methodologies for demonstrating improvements.

Strategies to Resolve Congestion Issues

Strategies must be identified to address the congested corridors. The CMS plan outlines several strategies. However, the strategies that can best impact these remaining corridors must be identified. There are both short term and long term strategies identified in the CMS plan that may be applicable. The strategies from the CMS plan are listed below:

Short Term Strategies

1. Carpooling, Vanpooling and Alternative Work Hours
2. Intersection and roadway widening, channelization, traffic surveillance and control systems, traffic control centers, computerized signal systems
3. HOV lanes, Guaranteed ride home programs
4. Park and ride and mode change factilities
5. Transit service enhancement or expansion
6. Incident management
7. General purpose lanes

Long Term Strategies

1. Telecommuting
2. Motorist information systems
3. HOV and bus bypass lanes, exclusive transit ROW, bus bypass ramps, paratransit services
4. Transit traffic signal preemption, transit information services
5. Bicycle facilities, pedestrian facilities
6. Growth management and activity center strategies
7. Access management techniques
8. Intelligent transportation systems and advanced public transportation system technology

In the 1996 CMS Plan, the short term strategies were identified for implementation during the first six years of the plan. The Long Term strategies were identified for implementation during year six through 20 of the plan. The November 2001 *Congestion Management System Plan Implementation* Appendix further discussed the strategies, concluding that the previously identified short term and long term strategies are both in the process of being implemented.

Many of the short term and long term strategies identified in the 1996 CMS Plan overlap. Therefore, to better evaluate the effectiveness of implementing these strategies a consolidated list of strategies was developed and is listed below.

Consolidated CMS Strategies

1. Carpooling, vanpooling, alternative work hours, guaranteed ride home, telecommuting, paratransit services, park and ride facilities
2. Intersection and roadway widening, channelization, traffic surveillance and control systems, traffic control centers, computerized signal systems
3. HOV Lanes, HOV and bus bypass lanes, bus bypass ramps
4. Bicycle facilities, pedestrian facilities
5. Transit service enhancement or expansion, transit traffic signal preemption, transit information services, exclusive transit ROW, and mode change factilities
6. Intelligent transportation systems and advanced public transportation system technology, incident management, and motorist information systems
7. Growth management and activity center strategies, access management techniques
8. General purpose lanes

In addition to providing congestion relief, strategies 2, 6, 7, and 8 provide positive benefits to the movement of goods and freight.

As the next step in this process each of the corridors on the congested network were reviewed in more detail by the ETC, local municipalities, and state DOT's to determine the strategies most appropriate to resolve the issues in each corridor. Some of the strategies are more global while others are corridor specific. The selection of these strategies must also consider the future congestion network to insure that the strategies selected will address both the existing and future congestion networks.

Table 16 provides a summary of the identified strategies that can be employed separately and collectively to help resolve congestion on the congested corridors.

Table 16 - Menu of Strategies to Address 2004 Congestion Network

Roadway Corridor	Location	CMS Strategy
Bill Morris Parkway (SR 385)	I-240 to Riverdale	1,3,5,6,7,8
Bill Morris Parkway (SR 385)	Winchester to Hacks Cross	1,3,5,6,7,8
Byhalia	Shelby to Frank	1,2,4,5,7,8
Covington Pike	Macon to Stage	1,2,4,5,7,8
Germantown	Winchester to Brother	1,2,4,5,7,8
Germantown (Hwy 305)	Stateline to US 78	1,2,4,5,7,8
Goodman	Pleasant Hill to Davidson	1,2,4,5,7,8
Goodman	Tulane to Tchulahoma	1,2,4,5,7,8
Hollywood	Sam Cooper to Jackson	1,2,4,5,7,8
HWY 61	Brooks to I-240 S	1,2,4,5,7,8
HWY 61	Church to Nail	1,2,4,5,7,8
HWY 61	Weaver to Shelby	1,2,4,5,7,8
I-240	SR 385 to I-40 E	1,3,6,7,8
I-240	I-55 to Lamar (US 78)	1,3,6,7,8
I-240 MT	I-55 to I-40	1,3,5,6,7,8
I-40	Miss. River to FA 101	1,3,5,6,7,8
I-55	HWY 304 to Stateline	1,3,6,7,8
I-55	McLemore to I-55 Bridge	1,6,7,8
I-55	US 61 to I-240 S	1,3,6,7,8
Interchange	Perkins at Winchester	1,2,5,7,8
Interchange	US 64 at I-40	1,2,4,5,6,7,8
McLean	Poplar to North Parkway	1,2,4,5,7,8
Park	I-240 E to Ridgeway	1,2,4,5,7,8
Pauline	Linden to Jefferson	1,2,4,5,7,8
Perkins	Poplar to Willow	1,2,4,5,7,8
Plough Boulevard	Airways to I-240	1,5,6,7,8
Poplar Avenue	Perkins to Chulahoma	1,2,4,5,7,8
Ridgeway/ Shady Grove	Park to Briarcrest	1,2,7,8
Shelby	I-55 to Mendenhall	1,2,4,5,7,8
Stage	Bartlett Blvd to Houston Levee	1,2,4,5,7,8
Summer	I-40 to Elmore	1,2,4,5,7,8
Sycamore View	Macon to Raleigh Lagrange	1,2,4,5,7,8
Thomas	Washington to Jackson	1,2,5,7,8
Thomas	Stage to Watkins	1,2,5,7,8
US 51	Paul Barrett Pkwy (SR 385) to West Union	1,2,7,8
US 78	Getwell to Craft	1,2,5,7,8
Walnut Grove	Waring to Walnut Bend	1,2,4,5,7,8
White Station	Poplar to Park	1,2,4,5,7,8
Winchester	Airways to Air Park	1,2,4,5,7,8

6. Effectiveness of CMS Strategies

The following paragraphs contain information on the effectiveness of the various CMS strategies for relieving congestion in the Memphis area. Documentation is provided for determining the maximum effectiveness of each strategy. In determining this level of effectiveness, data from both local programs and from national research has been consulted in order to identify the past effectiveness of these strategies in the Memphis area and the potential maximum effectiveness of these strategies, as reflected in other areas of the country. Finally, the expected impact of the strategies on congestion is shown for each corridor in the Congestion Network.

CMS Strategies

1. Carpooling, Vanpooling, Guaranteed Ride Home, Alternative Work Hours, Telecommuting, Paratransit Services, and Park and Ride Facilities

Carpooling and vanpooling are both forms of ridesharing. These strategies for reducing congestion may be agreements between private individuals, employer based, or government sponsored. There is an existing government sponsored rideshare program in the metropolitan area. As summarized in the Transportation Master Plan for the City of Boulder, Colorado, the estimated percent reduction in single occupant vehicle use per worksite for carpooling and vanpooling was 1%-5% and 1%-2%, respectively. Similar values were found in the Puget Sound Regional Vanpool Market Study. The existing Memphis area rideshare program has a ridership of approximately 2,000 persons in the peak hours. This represents less than 0.5% of the existing trips within the region. If local employers participated in, or created their own programs to promote carpooling and vanpooling, it is anticipated that the reduction in single occupant vehicle use would be no more than 2%.

Guaranteed Ride Home Programs provide guaranteed rides for people that use the car pool, van pool or rideshare programs that, due to extenuating circumstances, require a ride separate from their standard mode of transportation. For instance, if someone participating in a van pool program has a family emergency and must leave work early, the guaranteed ride home program would provide a means for that person to leave early to attend to that emergency. The benefits of this strategy are typically applied with and considered a part of the car pool, van pool, rideshare program.

Alternative work hours require cooperation from local employers and are currently conducted locally on a relatively small scale. There are several large employers in the urban, such as FedEx, area that maintain operations in the off peak periods. If an aggressive campaign to promote alternative work hours was executed, it is anticipated that the overall reduction of vehicular traffic during the peak periods would be less than 1%.

Advances in technology have enabled many to work from home. Telecommuting includes working from home or from a remote office to eliminate or reduce the work commute. As technology continues to evolve, more will be able to take advantage of the

benefits offered by telecommuting. The potential impact of telecommuting on our transportation system is difficult to ascertain. Where some occupations or fields of employment have and will be able to continue to utilize technology to avoid the work commute, there are other occupations where telecommuting is not possible. Also, since the cost associated with implementation of this technology is primarily borne by the employer, it is unknown how many companies in the Memphis region will use this technology to enable their employees to telecommute. The reduction or elimination of vehicular traffic associated with telecommuting could have a dramatic effect on our transportation system. Since a large proportion of the jobs in the Memphis area are related to distribution (warehousing, trucking, assembly) this strategy will have little impact in the Memphis area in the short term. However, this strategy should be investigated as part of the update of the CMS plan to determine if the nature of jobs in the Memphis area may change in future years, allowing more telecommuting to occur.

Paratransit is presently handled as a demand-responsive service in the Memphis area. This service is provided utilizing almost all non-fixed route transit, such as shuttle services, vanpools, contracted transit, and other community-based services. "A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility" identifies five broad categories of paratransit services:

- Vanpool promotion and leasing,
- Route substitution,
- Late night, weekend and low density services,
- Feeder or shuttle services to fixed route transit,
- Community-based services.

The benefits of such service above ordinary transit service are that it is flexible both in terms of route and schedule. From a study conducted by the City of Boulder, Colorado, paratransit services can be effective in neighborhoods where parking is restricted and in large commercial shopping areas where it may be too far for pedestrians to walk. Such a service is also of benefit to those unable to drive. The Memphis Area Transit Authority has already implemented this strategy.

Park and ride lots are parking lots constructed for the purpose of providing motorist a place to park and transfer to public transit, carpool, vanpool, or other means of transportation with a higher occupancy rate. They are generally located in the suburban or rural areas along major arterial or interstate routes. In the metropolitan area there are six planned park and ride facilities identified in this LRTP. The locations of the facilities are:

- I-40 at Collierville-Arlington Road
- I-40 at Canada Road
- I-40 at Germantown Parkway
- I-40 at Whitten Road
- I-55 at Holmes Road
- I-55 at Goodman Road

If each of these lots contained 200 spaces and they operated at capacity, the total vehicular traffic on I-40 and I-55 could be reduced by 1,600 and 800 vehicles per day, respectively. This represents a reduction in the traffic volume on segments of these roadways of up to 1.2%. The percent reduction on roadways within the urban area would be less as these numbers become diluted further away from the park and ride facilities.

2. Intersection and Roadway Widening, Channelization, Traffic Surveillance and Control Systems, Traffic Control Centers, Computerized Signal Systems.

There are a number of computer signal system projects identified for implementation throughout the Memphis MPO area. These projects are located on major and minor arterial roadways. For arterial roadways, travel speed is the primary factor in determination of the operational level of service. From *CMAQ Air Quality Analysis* (City of Memphis, May 2001), the average link speeds for arterial roadways are projected to increase by 18 percent (up to the posted speed limit) when a signal system is installed. From the *Highway Capacity Manual*, the threshold average travel speed that defines congestion for a class II arterial roadway is 17 mph. The expected 18% increase in travel speed associated with the installation of traffic signal systems means that roadways with existing travel speeds greater than 14.5 mph will have increases in travel speeds that will raise them above the 17 mph threshold that defines congestion.

3. HOV Lane, HOV and Bus Bypass Lanes, Bus Bypass Ramps.

As cited in "A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility", Michael D. Meyer, Ph.D., P.E., 1997, a number of studies have been completed regarding the impact of High Occupancy Vehicle (HOV) lanes on vehicle occupancy. For studies that have before and after data, there was an average 13% increase in vehicle occupancy. If the number of person trips remains the same, this increase in vehicle occupancy has the effect of reducing the number of vehicles on the roadway.

Assuming the existing average vehicle occupancy on the interstate system in the Memphis region is 1.08 persons per vehicle, the following calculation shows the anticipated decrease in traffic volume with the addition of an HOV lane. The existing volume on I-40 from Canada Road to Airline Road is 38,370 vehicles per day, with 41,440 person trips per day. If the averaged vehicle occupancy is increased by 13% to 1.22 persons per vehicle, the number of vehicles on the roadway is reduced to 33,970 vehicles per day.

HOV and bus bypass lanes and ramps are facilities used to improve the travel time associated with high occupancy vehicles. In the Memphis area, HOV lanes have been considered a method to increase people throughput on an interstate type facility. Used alone, these lanes are effective for commuters arriving from suburban areas. As HOV's attempt to enter or exit the HOV lanes, friction between HOV's and other vehicles in the general-purpose lanes occur as these vehicles move toward the access points to the

freeway system. This problem is made worse as the interchange density increases. Several methods have been developed to address this issue. These include HOV and bus bypass lanes and ramps. These exclusive facilities enable HOV's to access the freeway system without encountering delay either by providing direct exclusive access to the freeway system or by providing separate non-metered ramps. These strategies are effective in increasing HOV use when coupled with other HOV strategies.

4. Bicycle facilities, pedestrian facilities

Non-motorized transportation generally consists of walking and cycling. To promote the use of these forms of transportation adequate facilities must be provided. The City of Memphis currently has a program to upgrade sidewalks and handicap ramps at existing intersections. There are also designated bike routes within the metropolitan area. A bicycle and pedestrian plan is under development, and is scheduled for completion on or before December 31, 2004.

Non-recreational bicycle and pedestrian trips reduce the number of vehicles on the roadway. From a study conducted by the Comsis Corporation, it is estimated that increasing walk trips by 1% would reduce vehicle trips by 0.5%, and increasing the bike share mode by 1% would reduce trips on the roadway by 0.9%. The Puget Sound Regional Council estimated that an increase in bicycling would result in a less than 0.2% decrease in regional vehicle miles traveled (VMT). As the bicycle and pedestrian plan for the Memphis metropolitan area is completed, more information regarding their impact on the transportation system will be known.

5. Transit Service Enhancement Or Expansion, Transit Information Service, Transit Traffic Signal Preemption, Exclusive Transit Right-of-Way, Mode Change Facilities.

On arterial and major collector facilities, all vehicles, including transit, by traffic signalization, encounter delays. Many of these impacts may be resolved with traffic signal coordination along a corridor as noted in the short-term strategies. However, to encourage use of transit there are ways to decrease the travel time associated with transit vehicles. Transit traffic signal preemption can take many forms. For on street transit vehicles it provides an extended amount of green time for an approaching bus or trolley, in order to reduce delays for buses at traffic signals. On street transit vehicle preemption is generally limited to the extension of green time for the approach on which the transit vehicle is traveling. It will not truncate the green phase for an opposing direction. For transit vehicles in separate rights-of-way, preemption of traffic signals occurs in a manner similar to railroad preemption.

Previous attempts to use on street transit vehicle traffic signal preemption in the Memphis area were unsuccessful, due in large part to the limited technology at the time. With recent advances in technology, the potential positive impact of transit signal preemption should be explored. However, the impact of this strategy on the Congested Network is expected to be negligible.

Providing real time transit information to those accessing the transit system is an enhancement that may increase ridership over time. Information regarding the status of the service may include bus arrival times, headways, and route identification of the next bus. This real time information could be provided to those at the local bus stop, via internet or through in-vehicle systems. Further study should be conducted to determine the potential impact of this strategy in increasing transit ridership. This strategy becomes more important with the extension of the fixed rail transit systems being pursued at this time.

According to a study completed by the Puget Sound Regional Council, depending upon the type, amount, and cost of increased service, up to a 5% reduction in area-wide VMT can be expected with enhanced transit service. These enhancements include increased frequency of service, decreasing wait times, and decreased travel time. Improvement in transit service in the Memphis metropolitan area is likely to have less impact on the overall congestion on the roadways. It is anticipated that improved transit service or expansion would reduce area-wide traffic volumes on the roadway by less than 2%.

6. Intelligent Transportation Systems and Advanced Public Transportation System Technology, Incident Management, Motorist Information Service

The U.S. Department of Transportation defines Intelligent Transportation Systems (ITS) as "the integration of current and emerging technologies in fields such as information processing, communications, and electronics applied to solving surface transportation problems." ITS encompasses a large range of technologies and techniques including:

- Traffic signal control systems,
- Freeway management systems,
- Transit management systems,
- Incident management systems,
- Electronic toll collection
- Electronic fare payment,
- Railroad grade crossing warning systems,
- Emergency management systems, and
- Regional multimodal traveler information systems.

Incident management is an effective tool for reduction of delays and congestion subsequent to an incident. Incident management techniques have already been implemented on all of the interstate and freeway roadways throughout Shelby County. Since the remaining freeway and interstate roadways within the MPO area are relatively short sections, it is assumed that the majority of the measurable benefits have already been realized for this strategy and no additional credits will be included for this strategy. This strategy will impact freight movements throughout the area. Since the majority of freight movements occur on the freeway and interstate system, the benefits of this strategy on freight movement are already being realized.

From “A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility”, highway information systems can consist of:

- Changeable message signs,
- Highway advisory radio, and/or
- In-vehicle navigation and information systems.

These systems are provided to convey information to the traveler once on the roadway or prior to departure regarding delays from non-recurring congestion, construction delays, speed limits, weather conditions, and other items.

There are several motorist information systems projects in various stages of development at this time. TDOT is now conducting a study to implement a 511 system statewide. With this system, motorist can call 511 on their phone, and receive information about traffic congestion, construction delays, tourism, or other travel related data. Although this study is applicable statewide, it is anticipated that this system will be implemented in the Memphis area in conjunction with the Freeway Management System presently under design. Among other things, the freeway management system project will provide dynamic message signs (DMS) along the freeway system. These message signs will be used to alert motorists of delays and provide general information to the motorists.

With a reduction in cost, ease of use, and as an option in new vehicles, in-vehicle global positioning systems (GPS) are now more commonplace. These navigation systems, which are normally used to indicate position, can also direct the motorist to nearby facilities, such as gas stations, restaurants, and stores. Currently these systems lack the sophistication or infrastructure necessary to provide information related to non-recurring congestion, construction delays, and weather alerts. In-vehicle information systems are generally developed by non-governmental agencies to provide data available from government agencies to the motorist. As with the 511 system, more data is expected to become available in the future for these types of systems and it is expected that market demand will result in their implementation of more real time data.

While several of the ITS strategies listed above may increase travel speed, they may not be applicable or legal in the Memphis area. Other strategies may improve safety, such as railroad grade crossing warning systems, but may not reduce congestion on the roadway system. Many of the other strategies provide positive value, but quantitative estimates of the benefits are not yet available since many of these strategies are relatively new (“A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility”).

7. Growth Management, Activity Center Strategies, and Access Management Techniques

The impact of land use on the transportation system cannot be understated. Of all of the long-term strategies listed, growth management has the largest potential impact on the transportation system. From “A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility”, growth management is defined as “the use of public policy to

regulate the location, geographic pattern, density, quality and rate of growth of development". Government plays a crucial role in the development of the community through land use planning, zoning, and development ordinances. These "tools" can be used to guide development to cause less impact on the transportation infrastructure through:

- Compact residential development,
- Compact employment and activity centers,
- Mixed land uses,
- Connectivity,
- Transit and pedestrian oriented development,
- Jobs/Housing balance,
- Affordable housing, and
- Development impact mitigation.

Activity center strategies involve developing areas of employment, shopping, and recreation with high concentration of both workers and users. Dense mixed-use development generally corresponds well with high transit ridership. From a 1994 study conducted for the Puget Sound Regional Council, "change from SOV to other modes becomes significant at higher densities of greater than 50 employees per gross acre. At densities greater than 125 employees per gross acre a majority of trips are made using modes other than Single Occupant Vehicles".

Currently in the Memphis metropolitan area, when new development occurs developers are required to provide roadway improvements along their frontage. These improvements may include road widening, addition of turn lanes, and the installation of traffic signals. These improvements often increase the capacity of the roadway at that location, but lead to roadways with an inconsistent cross section as development takes place. This requirement may also be disproportionate in cost to developers as a large development with a small amount of frontage would incur less cost than a small development with greater road frontage. To address these and other growth issues, the MPO may want to initiate the exploration of development of an impact fee policy. In addition to a land use plan, this policy could be used to help shape the growth patterns for the region. If implemented this policy should address the cumulative impact of development.

A study conducted by Portland State University shows a 0-5% decrease in single occupant vehicle use over the short term and a 0-10% decrease in SOV's use over the long term where growth management strategies are used. A corresponding increase in transit use of 0-5% may be realized utilizing growth management strategies. Chapter 3 further defines the regional and community plans that are in place and the comprehensive growth strategies for the MPO area.

From "A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility", "access management is the control of the spacing, location, and design of driveways, medians/median openings, intersections, traffic signals, and freeway interchanges".

Access management improves the efficiency of the arterial and major collector roadways. Generally, as the number of drives increases on a roadway, the capacity of the roadway decreases. With fewer drives, or access points, to the roadway, the capacity of the roadway increases. A related benefit associated with a reduction in the number of driveways along a roadway is a dramatic decrease in the number of crashes. Planning is critical to implementation of access management techniques, as unplanned restriction of existing access to residents and businesses along the roadway system causes damage to the value of the property or business. There are several roadways in the metropolitan area that utilize access management techniques.

The primary benefit of access management is a reduction in the number of crashes. The reduction in number of crashes will result in reduced congestion on the arterial roadways. Because the frequency of crashes related to access points on a particular segment of arterial roadway is very small, the overall impact on congestion is small.

8. General Purpose Lanes

This strategy has the potential to have the most impact on congestion relief. It also will likely have the highest cost and will tend to negatively impact VMT and, in some cases, emissions. Therefore, the addition of general purpose lanes should be considered only after all of the other strategies have been evaluated and found to be ineffective. In some cases, where the other strategies will not provide the needed level of congestion relief, the addition of general purpose lanes will be required.

Status of Strategies Previously Initiated

The following is a brief description of the strategies that have been previously identified and are being employed.

1. Memphis Area Rideshare – This is a good example of a global strategy. For more information on this program, refer to the Alternative Transportation chapter.
2. Freeway Incident Management – This global strategy is difficult to quantify in terms of daily improvements to congestion. However, the degree of congestion reduction that occurs when incidents happen is well documented. The State of Tennessee has implemented Freeway Incident Management along the interstate system and SR 385 in Shelby County through the Tennessee Help Truck program. The focus of this program is to clear incidents and manage traffic at incidents to reduce the congestion that occurs due to stalled vehicles and non-injury crashes. Not only does this strategy reduce congestion, it enhances the movement of freight through the area by keeping the roads that carry the most freight clear of stalled vehicles and crashes. This already effective strategy will be enhanced with the implementation of the Freeway Management System that is presently under design.
3. Freeway Management System –With the MPO adoption of the Memphis ITS Regional Architecture, Tennessee DOT has programmed $45.5 million in the Memphis TIP for Early Phase and First Phase implementation. These phases will

include communication lines, cameras, speed detection, dynamic message signs, highway advisory radio, 511 messaging, and a traffic control center. The State of Mississippi has begun operation of video surveillance along Interstate 55 in northern DeSoto County. 511 messaging is included in the implementation plan for the Mississippi statewide ITS architecture. As these elements are implemented, they will help manage congestion by providing citizens and the local agencies information on congestion, allowing the citizens to choose other less congested routes and providing the local jurisdictions data to help better manage congestion. The enhanced information will also aid freight movements by providing carriers advance information on congested corridors, allowing them to plan alternative routes.

4. HOV Corridors – As part of the 1996 *Congestion Management System Plan*, a number of freeway corridors were identified as potentially feasible HOV corridors. HOV facilities reduce congestion by encouraging car pooling and reducing total VMT throughout the system. A detailed description of HOV lanes and a map indicating the locations that HOV lanes have been built and are operational as well as the HOV corridors that are planned can be found in **Appendix K.**

5. Traffic Signal Coordination – Memphis, Bartlett, Germantown, Collierville, Shelby County, DeSoto County and the State of Mississippi have identified numerous corridors to implement traffic signal coordination. Signal coordination will help reduce congestion by decreasing travel times along those corridors by an average of 18 percent. That decrease in travel time will improve the LOS for most corridors from E or F to D or better. Several of the existing corridors on the Congestion network have been designated for signal coordination. Documentation of the expected improvements to congestion has been provided in Air Quality studies developed for these and other corridors.

Congestion on some of the Congested Network corridors will be improved by projects that are near or adjacent to the congested corridor. In the Town of Collierville, the sections of Byhalia Road from Poplar Avenue to Frank Road and the section of SR 57 from Byhalia Road to Chulahoma Road will both be helped when the construction of SR 385 is completed from US 72 to north of SR 57. Much of the traffic on these congested corridors will choose to use SR 385, reducing the traffic volumes on Byhalia Road and on SR 57.

Similarly, the construction of Wolf River Boulevard from east of Germantown Parkway to west of Forrest Hill-Irene Road will divert 10 to 15% of the traffic from Germantown Parkway between Poplar and the Wolf River to Wolf River Boulevard. This section of Wolf River Boulevard will also attract traffic from Poplar Avenue and relieve some of the congestion on Poplar Avenue between Kimbrough and Forrest Hill-Irene.

The construction of I-69/ 269 in northern Shelby County will help to relieve congestion on US 51 from SR 385 to West Union.

The impact of the strategies presently being employed is reflected in the present traffic volumes. Even with the implementation of these strategies, there remain numerous congested networks. Other strategies must be considered to relieve the congestion.

Estimated Impact of CMS Strategies

The addition of general-purpose lanes should be the last of the short term strategies considered for relief of congestion. **Tables 17 and 18** provide a summary of the maximum potential impact of the CMS strategies identified for each corridor in **Table 16**. **Table 17** provides the impacts of all strategies except the addition of general-purpose lanes. **Table 18** provides the results of utilizing general-purpose lanes for those corridors where the other strategies were not able to resolve the congestion issues. In both Tables 12 and 13, a level of service indicated as "D+" means that the level of service will be D or better.

It should be noted that the specific benefits of strategies are not necessarily cumulative, as some of the strategies are redundant. For example, providing park and ride facilities will encourage a reduction in single occupant vehicles and these HOVs will result in a higher use of HOV lanes. However, the increases in both areas are not cumulative. This has been accounted for in the tabulation of the impacts of these strategies.

As can be seen in **Table 18** there are some corridors that are still identified as congested after all of the strategies have been applied. These corridors were evaluated utilizing the maximum practical limits of the CMS strategies. Therefore, the solutions to resolve congestion in these corridors may involve more complex solutions. For instance, to relieve the congestion on Germantown Parkway between Walnut Grove and Trinity Road may require the construction of other new roadways and the widening of I-240. However, due to the uncertainty of projects such as Kirby Parkway between Walnut Grove and Macon Road, these potential solutions cannot be effectively modeled at this time. Further evaluation and monitoring is required to determine effective congestion relief solutions for these corridors.

Impact of CMS Strategies on 2004 Congested Network

The results of all of the CMS strategies were overlaid on the 2004 Congested Network to identify those corridors where congestion issues remain. As can be seen from **Figure 35**, the congestion on the majority of the roadways on the 2004 Congested Network would be resolved by the application of these strategies.

To help identify the general purpose lane improvements that would be required to help resolve the congestion identified on the 2004 Congested Network, a list of the general purpose lane improvements was developed. **Table 19** provides a summary of the general-purpose lane improvements that would be needed to address existing congestion.

Table 17 - Benefits of CMS Strategies 1 Through 7

Roadway	Location	Existing / Projected LOS	Improvement in Measures of Effectiveness							Anticipated LOS with Strategy In Place
			Carpool , Park & Ride (veh/hr)*	Signal Systems (mph)**	HOV Lanes (veh/hr)*	Bicycle & Peds* (veh/hr)	Enhanced Transit (veh/hr)*	Incident Manage-ment, ITS (mph)***	Growth Management (veh/hr)*	
Bill Morris Pkwy (SR 385)	I-240 to Riverdale	F	+156		+860		+156	0	+78	F
Bill Morris Pkwy (SR 385)	Winchester to Hacks Cross	E	+75		+412		+75	0	+37	D+
Byhalia	Winchester to Poplar	F	+50	+1.7		+12	+50		+25	F
Covington Pike	Macon to Stage	F	+72	+1.9		+18	+72		+36	F
Germantown	Winchester to Brother	F	+103	+6.4		+26	+103		+51	D+[1]
Germantown (Hwy 305)	Stateline to US 78	F	+33	+0.8		+8	+33		+17	F
Goodman	Pleasant Hill to Davidson	F	+42	+8.4		+11	+42		+21	D+
Goodman	Tulane to Tchulahoma	F	+63	+4.6		+16	+63		+32	D+
Hollywood	Sam Cooper to Jackson	F	+18	+0.6		+5	+18		+9	F
Hwy 61	Brooks to I-240 S	F	+40	+6.0		+10	+40		+20	D+
Hwy 61	Church to Nail	F	+33	+2.1		+8	+33		+17	E
Hwy 61	Weaver to Shelby	E	+38	+6.8		+9	+38		+19	D+
I-240	Bill Morris Pkwy (SR 385) to I-40 E	F	+174		+955			0	+87	F
I-240	I-55 to Lamar (US 78)	F	+138		+757			0	+69	E
I-240 MT	I-40 to I-55	F	+85		+467		+85	0	+42	D+
I-40	Mississippi River to FA 101 Connector	E	+55		+303		+55	0	+28	D+
I-55	HWY 304 to Stateline	F	+155		+531			0	+48	F
I-55	McLemore to Crump	E	+53					0	+26	D+
I-55	Crump to I-55 Bridge	E	+53					0	+26	D+
I-55	US 61 to I-240 S	E	+174		+598			0	+54	D+
Interchange	Perkins & Winchester	F	+20				+20		+10	F
Interchange	US 64 & I-40	F	+62			+16	+62	0	+31	F
McLean	Poplar to North Parkway	F	+26	+2.0		+7	+26	0	+13	E
Park	I-240 E to Ridgeway	E	+57	+3.2		+14	+57		+28	D+

Table 17 (cont.) - Benefits of CMS Strategies 1 Through 7

Roadway	Location	Existing / Projected LOS	Improvement in Measures of Effectiveness							Anticipated LOS with Strategy In Place
			Carpool, Park & Ride (veh/hr)*	Signal Systems (mph)**	HOV Lanes (veh/hr)*	Bicycle & Peds* (veh/hr)	Enhanced Transit (veh/hr)*	Incident Manage-ment (mph)***	Growth Management, ITS (veh/hr)*	
Pauline	Linden to Jefferson	F	+13	+1.8		+3	+13		+7	D+
Perkins	Poplar to Willow	F	+31	+3.1		+8	+31		+15	D+
Plough Blvd	I-240 to Airways	E	+104				+104	0	+52	E
Poplar Avenue	Perkins to Poplar Estates Parkway	E	+90	+4.5		+23	+90		+45	D+[2]
Poplar Avenue	Poplar Estates Parkway to Maynard Way	E	+55	+4.5		+14	+55		+28	D+
Poplar Avenue	Maynard Way to Chulahoma Road	E	+35	+4.5		+9	+35		+17	D+
Ridgeway/Shady Grove	Park to Poplar	F	+40	+3.1					+20	D+
Ridgeway/Shady Grove	Poplar to Briarcrest	F	+40	+3.1					+20	D+
Shelby	I-55 to Mendenhall	F	+62	+5.1		+16	+62		+31	D+
Stage	Bartlett Blvd to Houston Levee	E	+61	+6.0		+15	+61		+31	D+
Summer	I-40 to Elmore	F	+33	+2.0		+8	+33		+17	E
Sycamore View	Macon to Pleasant View	F	+57	+3.5		+14	+57		+28	D+
Sycamore View	Pleasant View to Raleigh-LaGrange	F	+57	+3.5		+14	+57		+28	D+
Thomas	Washington to Jackson	F	+38	+2.0			+38		+19	E
Thomas	Stage to Watkins	F	+51	+5.6			+51		+26	D+
US 51	Paul Barret Pkwy (SR 385) to West Union	F	+65	+2.1					+33	E
US 78	Getwell to Craft	F	+59	+4.6			+59		+30	D+
Walnut Grove	Waring to Walnut Bend	F	+89	+5.3		+22	+89		+45	D+[3]
White Station	Poplar to Park	F	+32	+2.2		+8	+32		+16	D+
Winchester	Airways to Air Park	F	+51	+5.5		+13	+51		+25	D+

* Measure of effectiveness is a reduction in vehicular volume, generally reduction in SOV, through carpooling park, park and ride lots, HOV lanes, etc. (veh/hr)

** Measure of effectiveness is an increase in travel speed through traffic signal systems, intersection widening, etc. . See Methodology for more information.

*** Measure of effectiveness is an increase in travel speed by reduced wait times associated with incidents/accidents on the roadway system (mph)

"D+" indicates LOS D or better

[1] LOS F from Walnut Grove to Trinity

[2] LOS F from White Station to Yates

[3] LOS F from I-240 to Briarview Road

Table 18 - Benefits of Adding General Purpose Lanes

Roadway	Location	Existing / Projected LOS	Improvement in Measure of Effectiveness	Anticipated LOS with Strategy In Place
			Gen. Purpose Lanes (veh/hr)*	
Bill Morris Pkwy (SR 385)	I-240 to Riverdale	F	3,857	D+
Byhalia	Winchester to Poplar	F	1,151	D+
Covington Pike	Macon to Stage	F	384-1,151	D+[1]
Germantown (HWY 305)	Stateline to US 78	F	1,151	D+
Hollywood	Sam Cooper to Jackson	F	1,151	D+
HWY 61	Church to Nail	E	694	D+
I-240	Bill Morris Pkwy (SR 385) to I-40 E	F	1,929	D+
I-240	I-55 to Lamar (US 78)	E	2,014	D+
I-55	HWY 304 to Stateline	F	2,228-3,943	D+
Interchange	Perkins & Winchester	F	Interchange Improvements	D+
Interchange	US 64 & I-40	F	Interchange Improvements	D+
McLean	Poplar to North Parkway	E	768	D+
Plough Blvd	I-240 to Airways	E	Interchange Improvements	D+
Summer	I-40 to Elmore	E	1,151	D+
Thomas	Washington to Jackson	E	-**	E
US 51	Paul Barret Pkwy (SR 385) to West Union	E	768	D+

* Measure of effectivess is an increase in capacity by increasing the number of general purpose lanes on the subject roadway (veh/hr)

** Physical limitations do not allow addition of general purpose lanes. Section remains unresolved.

"D+" indicates LOS D or better

[1] LOS F from Pleasant View to I-40

Figure 35
Existing Congested Network and Impact of Strategy Implementation

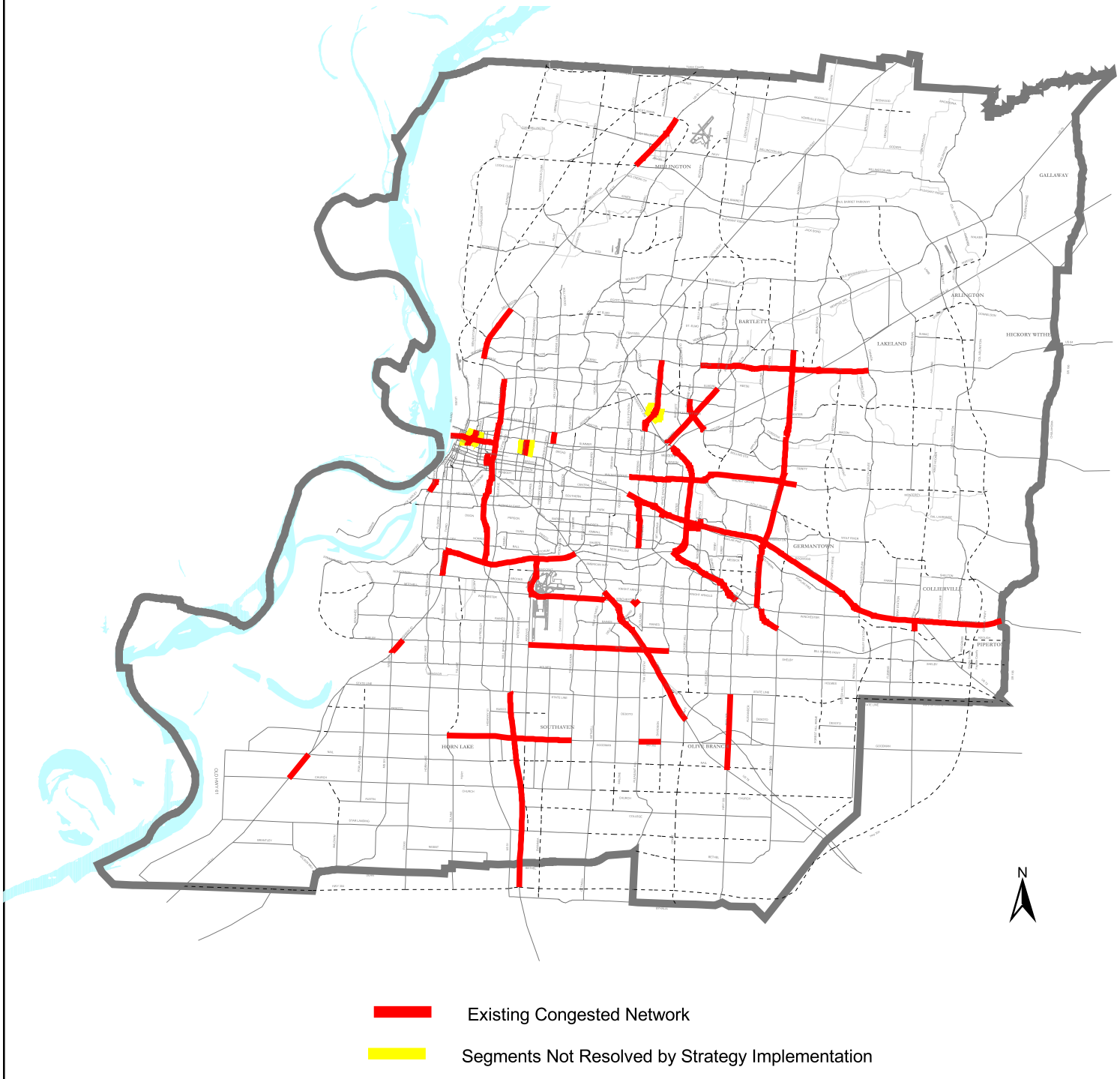


TABLE 19 – Required General Purpose Lane Improvements

Roadway	Location	Existing Lanes	Required Lanes
Bill Morris Pkwy (SR 385)	I-240 to Riverdale	6	10
Byhalia	Winchester to Poplar	5	7
Covington Pike	Macon to Stage	4	7
Germantown (HWY 305)	Stateline to US 78	2	5
Hollywood	Sam Cooper to Jackson	2	5
HWY 61	Church to Nail	2	4
I-240	Bill Morris Pkwy (SR 385) to I-40 E	6	8
I-240	I-55 to Airways	6	8
I-240	Airways to Lamar	8	10
I-55	HWY 304 to Goodman	4	6
I-55	Goodman to Stateline	6	8
Interchange	Perkins & Winchester	Interchange Improvements	
Interchange	US 64 & I-40	Interchange Improvements	
McLean	Poplar to North Parkway	2	4
Plough Blvd	I-240 to Airways	Interchange Improvements	
Summer	I-40 to Elmore	4	7
US 51	Paul Barret Pkwy (SR 385) to West Union	4	6

7. Future Congested Network

To assist with the identification of long range projects, the ETC recommended utilizing the 2026 Regional Travel Forecasting Demand Model to identify those roadway segments with V/C ratios greater than 0.90. **Figure 36** illustrates the roadways that would be experiencing congestion if the 2026 Land Use were applied to the 2004 roadway network. This map will provide an indication of congestion in the Year 2026 if no roadway improvements are made. **Table 20** lists and **Figure 37** illustrates the roadways that would be congested if the 2026 Land Use were applied to the planned 2026 transportation network. This is the condition that is projected to occur in 2026 and is identified as the Future Congested Network. This future congestion network will be used to identify projects for the LRTP.

It should be noted that the 2026 Land Use and transportation network contained in the Regional Travel Demand Model are based on the Light Rail growth alternative. Therefore, some of the trips on the future network will be accommodated by the future light rail system and will reduce trips on the future roadway system. This alternative transportation system will help to reduce congestion in some corridors.

Similar to the analysis that was performed on the 2004 Congested Network, the 2026 Congested Network was evaluated using the CMS Strategies previously outlined. **Table 21** provides a summary of the CMS strategies that can be employed both individually and collectively to help resolve congestion on the 2026 Congested Network.

Estimated Impact of CMS Strategies

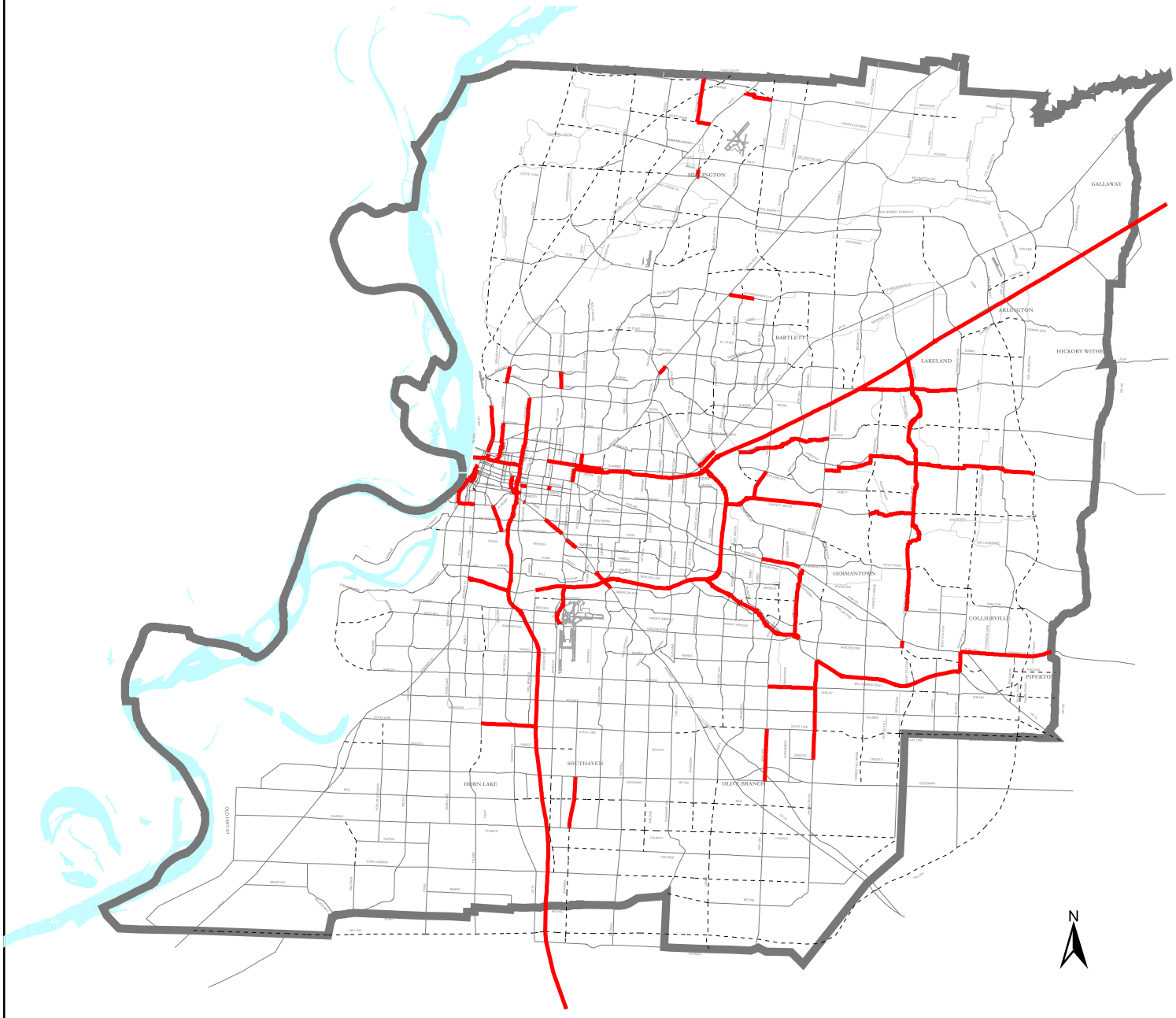
The impact of the CMS strategies identified for each corridor is summarized in **Tables 22 and 23**. **Table 22** provides the impacts of all of the strategies except the addition of general purpose lanes. For those corridors where the other strategies were unable to resolve the congestion issues, **Table 23** summarizes the impact of the addition of general purpose lanes. For those corridors where general purpose lanes will be required to address the congestion, **Table 24** provides a summary of the number of lanes required to relieve the congestion.

TABLE 20 - 2026 Congestion Network

Road	Location	V/C Ratio	Level of Service
Austin Peay	I-40 to Coleman	1.20	F
Bill Morris Parkway (SR 385)	I-240 to Riverdale	1.13	F
Bill Morris Parkway (SR 385)	Hacks Cross to Houston Levee	1.18	F
Belvedere	Madison to Poplar	1.03	F
Goodlett	Poplar to Walnut Grove	0.98	E
Hacks Cross	Shelby to Bill Morris Pkwy	0.91	E
Highland	Central to Poplar	1.09	F
I-240 E	Bill Morris Pkwy (SR 385) to I-40	1.31	F
I-240 MT	I-240 S to I-40	1.20	F
I-240 S	I-240 MT to Bill Morris Pkwy (SR 385)	1.16	F
I-40	I-240 to SR 196	1.25	F
I-40	Second to FA 101 Connector	1.49	F
I-40	FA 101 Connector to I-40 E	1.29	F
I-55	I-240 S to Nail	1.04	F
Jackson	Wales to I-40	0.97	E
Lamar (US 78)	American Way to Prescott	1.10	F
Lamar (US 78)	Shelby to Winchester	0.94	E
Lamar (US 78)	Stateline Road to Craft	1.06	F
Madison	Danny Thomas to Third	1.66	F
McLean	N. Parkway to Poplar	1.21	F
Mississippi Blvd.	Crump to S. Parkway	1.05	F
N. Watkins	James to I-40	0.93	E
Perkins	Poplar to Walnut Grove	1.10	F
Plough Blvd.	Democrat to Winchester	0.95	E
Poplar	I-240 to Ridgeway	1.20	F
Riverside Drive	Union to Crump	1.06	F
Sam Cooper	I-240 to Tillman	1.16	F
Southern	Goodlett to Highland	1.05	F
Summer (US70)	I-40 to Bartlett Road	0.94	E
Third	N. Parkway to I-40	0.91	E
Thomas	Firestone to Chelsea	0.93	E
Tillman	Summer to Walnut Grove	1.00	E
Walnut Grove	Yates to Germantown Pkwy	1.12	F
Walnut Grove	Mendenhall to Perkins	1.24	F
Walnut Grove	Tillman to Poplar	1.01	F

TABLE 20 (Cont.) - 2026 Congestion Network			
Road	**Location**	**V/C Ratio**	**Level of Service**
Interchange	I-69 at Paul Barrett Parkway	1.06	F
Interchange	I-69 at Fite Extension	1.04	F
Interchange	Byhalia at Bill Morris Parkway	0.96	E

Figure 36
No-Build Scenario
(2026 Pop/Emp on 2004)



2026 on 2004 Congested Network (No-Build Scenario)

Figure 37
Future Congested Network (2026 Model)

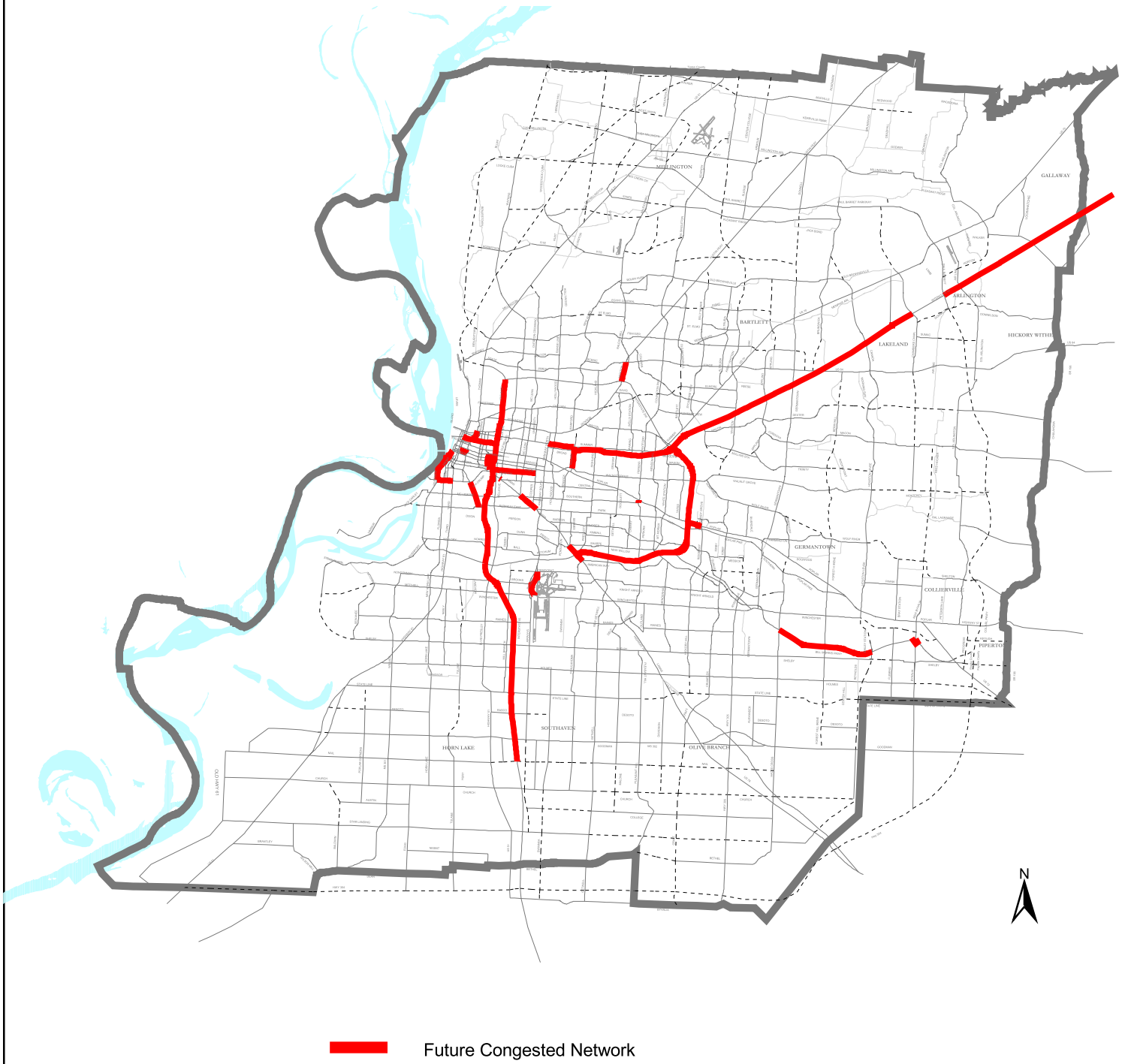


TABLE 21 - Menu of CMS Strategies for 2026 Congestion Network

Road	Location	CMS Strategy
Austin Peay	I-40 to Coleman	1,5,6,7,8
Bill Morris Parkway (SR 385)	I-240 to Riverdale	1,3,5,6,7,8
Bill Morris Parkway (SR 385)	Hacks Cross to Houston Levee	1,3,5,6,7,8
Belvedere	Madison to Poplar	1,2,4,5,7,8
Goodlett	Poplar to Walnut Grove	1,2,4,5,7,8
Hacks Cross	Shelby to Bill Morris Pkwy	1,2,4,5,7,8
Highland	Central to Poplar	1,2,4,5,7,8
I-240 E	Bill Morris Pkwy (SR 385) to I-40	1,3,6,7,8
I-240 MT	I-240 S to I-40	1,3,5,6,7,8
I-240 S	I-240 MT to Bill Morris Pkwy (SR 385)	1,3,6,7,8
I-40	I-240 to SR 196	1,3,6,7,8
I-40	Second to FA 101 Connector	1,3,5,6,7,8
I-40	FA 101 Connector to I-40 E	1,3,5,6,7,8
I-55	I-240 S to Nail	1,3,6,7,8
Jackson	Wales to I-40	1,2,4,5,7,8
Lamar (US 78)	American Way to Prescott	1,2,4,5,7,8
Lamar (US 78)	Shelby to Winchester	1,2,4,5,7,8
Lamar (US 78)	Stateline Road to Craft	1,2,4,5,7,8
Madison	Danny Thomas to Third	1,2,4,5,7,8
McLean	N. Parkway to Poplar	1,2,4,7,8
Mississippi Blvd.	Crump to S. Parkway	1,2,4,5,7,8
N. Watkins	James to I-40	1,2,5,7,8
Perkins	Poplar to Walnut Grove	1,2,4,5,7,8
Plough Blvd.	Democrat to Winchester	1,5,6,7,8
Poplar	I-240 to Ridgeway	1,2,5,7,8
Riverside Drive	Union to Crump	1,2,4,7,8
Sam Cooper	I-240 to Tillman	1,4,5,6,7,8
Southern	Goodlett to Highland	1,2,4,5,7,8
Summer (US70)	I-40 to Bartlett Road	1,2,5,7,8
Third	N. Parkway to I-40	1,2,4,5,7,8
Thomas	Firestone to Chelsea	1,2,4,5,7,8
Tillman	Summer to Walnut Grove	1,2,4,5,7,8
Walnut Grove	Yates to Germantown Pkwy	1,2,4,5,7,8
Walnut Grove	Mendenhall to Perkins	1,2,4,5,7,8
Walnut Grove	Tillman to Poplar	1,2,4,5,7,8
Interchange	I-69 at Paul Barrett Pkwy	1,2,3,6,7,8
Interchange	I-69 at Fite Extension	1,2,3,6,7,8
Interchange	Byhalia at Bill Morris Parkway	1,2,6,7,8

Table 22 - Benefits of CMS Strategies 1 Through 7 for Year 2026 Congested Network

Roadway	Location	Existing / Projected LOS	Improvement in Measures of Effectiveness							Anticipated LOS with Strategy In Place
			Carpool , Park & Ride (veh/hr)*	Signal Systems (mph)**	HOV Lanes (veh/hr)*	Bicycle & Peds* (veh/hr)	Enhanced Transit (veh/hr)*	Incident Manage-ment, ITS (mph)***	Growth Management (veh/hr)*	
Austin Peay	I-40 to Coleman	F	+47				+47	0	+24	D+
Bill Morris Pkwy (SR 385)	Hacks Cross to Houston Levee	F	+74		+406		+74	0	+37	D+
Bill Morris Parkway (SR 385)	I-240 S to Riverdale	F	+115		+631		+115	0	+57	D+
Belvedere	Madison to Poplar	F	+13	+6.1		+3	+13		+6	D+
Goodlett	Poplar to Walnut Grove	E	+26	+5.6		+7	+26		+13	D+
Hacks Cross	Shelby to Bill Morris Pkwy	F	+68	+2.0		+17	+68		+34	E
Highland	Central to Poplar	F	+37	+6.5		+9	+37		+19	D+
I-240 E	Bill Morris Pkwy (SR 385) to I-40	F	+172		+944			0	+86	E
I-240 MT	I-240 S to I-40	F	+155		+851		+155	0	+77	D+
I-240 S	I-240 MT to Bill Morris Pkwy (SR 385)	F	+167		+918			0	+83	E
I-40	I-240 to SR 196	F	+148		+815			0	+74	D+
I-40	Second to I-240 MT	F	+83		+458		+83	0	+42	D+
I-40	I-240 MT to FA 101 Connector	F	+83		+458		+83	0	+42	D+
I-40	FA 101 Connector to I-40 E	F	+137		+755		+137	0	+69	E
I-55	I-240 S to Nail	F	+139		+766			0	+70	D+
Jackson	Wales to I-40	E	+57	+3.0		+14	+57		+29	D+
Lamar (US 78)	American Way to Prescott	F	+83	+.7		+21	+83		+42	F
Lamar (US 78)	Shelby to Winchester	E	+62	+6.8		+16	+62		+31	D+
Lamar (US 78)	Stateline Road to Craft	F	+83	+1.8		+21	+83		+41	F

Table 22 (cont.) - Benefits of CMS Strategies 1 Through 7 for Year 2026 Congested Network

Roadway	Location	Existing / Projected LOS	Improvement in Measures of Effectiveness							Anticipated LOS with Strategy In Place
			Carpool, Park & Ride (veh/hr)*	Signal Systems (mph)**	HOV Lanes (veh/hr)*	Bicycle & Peds* (veh/hr)	Enhanced Transit (veh/hr)*	Incident Manage-ment (mph)***	Growth Management, ITS (veh/hr)*	
Madison	Danny Thomas to Third	F	+15	+4.3		+4	+15		+7	D+
McLean	N. Parkway to Poplar	F	+15	+6.3		+4			+7	D+
Mississippi Blvd.	Crump to S. Parkway	F	+30	+1.2		+8	+30		+15	F
N. Watkins	James to I-40	E	+46	+3.2			+46		+23	D+
Perkins	Poplar to Walnut Grove	F	+27	+6.5		+7	+27		+14	D+
Plough Blvd.	Democrat to Winchester	E	+48				+48	0	+24	D+
Poplar	I-240 to Ridgeway	F	+85	+.6			+85		+43	F
Riverside Drive	Union to Crump	F	+23	+5.8		+6			+11	D+
Sam Cooper	I-240 to Tillman	F	+114			+28	+114	0	+57	F
Southern	Goodlett to Highland	F	+35	+.7		+9	+35		+17	D+
Summer (US 70)	I-40 to Bartlett Road	E	+52	+7.0			+52		+26	D+
Third	N. Parkway to I-40	E	+16	+6.5		+4	+16		+8	D+
Thomas	Firestone to Chelsea	E	+22	+6.3		+5	+22		+11	D+
Tillman	Summer to Walnut Grove	F	+42	+3.4		+11	+42		+21	D+
Walnut Grove	Yates to Germantown Pkwy	F	+174	+1.8		+44	+174		+87	F
Walnut Grove	Mendenhall to Perkins	F	+42	+3.0		+11	+42		+21	D+
Walnut Grove	Tillman to Poplar	F	+43	+2.8		+11	+43		+22	D+
Interchange	I-69 at Paul Barrett Pkwy	F	+50		+273			0	+25	E
Interchange	I-69 at Fite Extension	F	+29		+161			0	+15	D+
Interchange	Byhalia at Bill Morris Pkwy	E	+32					0	+16	E

* Measure of effectiveness is a reduction in vehicular volume, generally reduction in SOV, through carpooling park, park and ride lots, HOV lanes, etc. (veh/hr)

** Measure of effectiveness is an increase in travel speed through traffic signal systems, intersection widening, etc. . See Methodology for more information.

Table 23 - Benefits of Adding General Purpose Lanes for Year 2026 Congested Network

Roadway	Location	Projected LOS	Improvement in Measure of Effectiveness	Anticipated LOS with Strategy In Place
			Gen. Purpose Lanes (veh/hr)*	
Hacks Cross	Shelby to Bill Morris	E	1,536	D+
I-240 E	Bill Morris Pkwy to I-40	E	3,857	D+
I-240 S	I-240 MT to Bill Morris	E	1,929	D+
I-40	FA 101 Connector to I-40 E	E	2,014	D+
Lamar (US 78)	American Way to Prescott	F	-**	F
Lamar (US 78)	Stateline Road to Craft	F	1,971	D+
Mississippi Blvd	Crump to S. Parkway	F	1,032	D+
Poplar	I-240 to Ridgeway	F	-**	F
Sam Cooper	I-240 to Tillman	F	1,928	D+
Walnut Grove	Yates to Germantown Pkwy	F	-**	F
Interchange	I-69 at Paul Barrett	E	Interchange Improvements	D+
Interchange	Byhalia at Bill Morris	E	Interchange Improvements	D+

* Measure of effectivess is an increase in capacity by increasing the number of general purpose lanes on the subject roadway (veh/hr)

* Physical limitations do not allow addition of general purpose lanes. Section remains unresolved.

“D+” indicates LOS D or better

TABLE 24 – Required General Purpose Lane Improvements for Year 2026 Congested Network

Roadway	Location	Existing Lanes	Required Lanes
Hacks Cross	Shelby to Bill Morris	6	10
I-240 E	Bill Morris Pkwy to I-40	8	12
I-240 S	I-240 MT to Bill Morris	8	10
I-40	FA 101 Connector to I-40 E	6	8
Lamar (US 78)	Stateline Road to Craft	4	6
Mississippi Blvd	Crump to S. Parkway	2	4
Sam Cooper	I-240 to Tillman	6	8
Interchange	I-69 at Paul Barrett	Interchange Improvements	
Interchange	Byhalia at Bill Morris	Interchange Improvements	

Funding for CMS Projects

The strategies listed and the benefits shown, portrays the maximum benefits that can be achieved if those strategies are implemented. As part of the CMS process, to encourage the implementation of the strategies a block of funding is being recommended to support the cost of implementation. Initially there will be $ 52,000,000 available over the period of this planning horizon (2007-2026). This funding comes from various sources listed in **Table 25** below.

Table 25 – Funding for CMS Projects

Funding Source	2007 - 2016	2017 - 2026	Total by Funding Source
Interstate Maintenance (IM)	$2,426,000	$3,969,624	$6,395,624
NHS/NCPD	$6,802,810	NA	$6,802,810
Tennessee State STP (SSTP)	$16,771190	$3,969,624	$20,740,814
Local STP (LSTP)	NA	$18,060,725	$18,060,725
Mississippi	NA	NA	NA
Total	**$44,060,752**	**$7,939,248**	**$52,000,000**

Also this funding designation is identified in the financial part of the LRTP report. Initial recommendation is that these funds would be strictly available for the implementation of the CMS strategies excluding the addition of general purpose lanes for the defined congested corridors. Also it is being recommended that the CMS projects have to be prioritized using the *Transportation Improvement Program* (TIP) project selection criteria that is being used currently, and as amended in the future by the MPO, to qualify for funding. Once the project is complete the corridor should be monitored and evaluated for the benefits achieved from the project.

6. Congestion Management System Conclusion

As can be seen for both the 2004 Congested Network and the 2026 Congested Network, while the identified CMS strategies significantly reduce the amount of congestion, there are still a number of congested corridors that require further study to identify projects to address these issues. Some of the strategies that are identified in the CMS plan require long term commitments to be effectively implemented. Strategies such as car pooling, park and ride lots and transit service enhancements require promotion and demonstration of benefits in order to generate enough users to effectively impact the congested network. Strategies such as the implementation of HOV lanes require commitments of both time and money for construction and public education before the full benefits can be realized. Growth management strategies require commitment by the local government agencies to modify zoning codes to make them attractive for new development.

As stated previously, the success of the Congestion Management System plan is dependant upon the collective implementation of the identified congestion relief strategies. The projects that have been identified to relieve congestion have been included in the LRTP to be enacted over the next 20 years to address both the existing and expected congestion. As growth continues in the area, the Congested Network will be reviewed regularly to make sure that the projects identified for inclusion in the TIP and LRTP will effectively address congestion on a long-term basis. These projects will also be evaluated for their potential impact on the freight system and other transportation elements. The commitment of time and resources that are critical to successfully implement programs, such as the car pooling, park and ride lots, HOV lanes, and growth management strategies are included in the LRTP.

In order for the MPO to effectively identify and implement the appropriate congestion relief strategies, the congestion management system plan must be a dynamic document. The present CMS plan was developed in 1996, and was based on the best knowledge available at the time. However, other congestion relief strategies have been identified since then. Further, the congestion network needs to be continually reviewed and modified to help guide project selection. Therefore, the existing CMS plan will be updated in the near future.

One of the tools that can be most effective in the management of the CMS plan is the regional travel demand-forecasting model. The present model has served the community well for the last 30 years. However, the weaknesses of the existing model hamper the ability of staff to efficiently monitor the congestion network. The proposed new model, as described in the Regional Travel Demand Model Study Design, will provide a menu of tools to help with this process including newer and more accepted means to determine road capacities and LOS. The project to develop the new travel demand forecasting model will begin in early 2004, providing the staff an integral tool to help better monitor the congested network and effectively implement the CMS plan.

Interagency cooperation is a key element to the successful implementation of the CMS Plan. The MPO staff will work closely with the local agencies, the public, TDOT, MDOT and the FHWA to implement the strategies identified to address the congestion management issues. All of these groups will have a role in the development of the new CMS plan, the development of the new Regional Travel Demand Forecasting Model, and the implementation of the strategies required to address the congestion issues. The MPO staff will assist these groups by providing the timely information and data required for making sound decisions and implementing projects to help relieve congestion in the Memphis MPO area.